We claim:

1. An adapter for converting single-ended coaxial signals to differential signals, comprising:

at least two coaxial interfaces for coupling to a coaxial device;

a first signal conductor for transmitting signals through the adapter;

a second signal conductor for transmitting signals through the adapter;

a shield conductor;

a transition region for providing a transition between coaxial and differential transmission environments and maintaining a uniform differential impedance through the transition; and

a differential interface for coupling to a differential device.

2. The adapter of claim 1, wherein the transition region includes the first signal conductor, the second signal conductor and the shield conductor, having dimensions providing uniform differential impedance.

3. The adapter of claim 1, wherein the transition region includes a coupling device for connecting a first portion of the first signal conductor to a second portion of the first signal conductor and connecting a first portion of the second signal conductor to a second portion of the second signal conductor.

4. The adapter of claim 1, wherein in the transition region, a first portion of the first signal conductor is spliced together with a second portion of the first signal conductor and a first

portion of the second signal conductor is spliced together with a second portion of the second signal conductor.

5. The adapter of claim 1, wherein the differential interface includes an air space between the first conductor and the second conductor.

6. The adapter of claim 1, wherein the at least two coaxial interfaces are standard precision coaxial interfaces.

7. The adapter of claim 6, wherein the diameter of the at least two coaxial interfaces is selected from the group consisting of 1.0 millimeter, 1.85 millimeters, 2.4 millimeters, 3.5 millimeters or 7 millimeters.

8. The adapter of claim 1, wherein a center axis of each of the at least two coaxial interfaces is situated at an angle between 0 and 90 degrees from the center axis of the differential interface.

9. The adapter of claim 1, wherein the differential interface further comprises a mating member for mating to another device for measurement with a 4-port vector network analyzer.

10. The adapter of claim 1, wherein said transition region further includes a dielectric support structure at or near the transition between the coaxial and differential transmission environments.

11. The adapter of claim 1, wherein the diameter and dimensions of the first conductor and second conductor vary within the transition region.

12. The adapter of claim 1, further comprising dielectric beads for supporting the first signal conductor and the second signal conductor.

13. The adapter of claim 1, wherein a center axis of each of the at least two coaxial interfaces is situated at an angle of 10-degrees from the center axis of the differential interface.

14. An interface apparatus for connecting a differential device to an adapter for converting single-ended coaxial signals to differential signals, comprising:

a first differential signal conductor;

a second differential signal conductor; and

a shield conductor,

wherein the diameter of the shield conductor is substantially equal to four times the diameter of the first differential signal conductor.

15. The interface apparatus of claim 14, wherein a center axis of the first differential signal conductor and a center axis of the second differential signal conductor are each situated at a substantially equal distance between an inner surface of the shield conductor and a center axis of the shield conductor.

16. The interface apparatus of claim 14, wherein the first differential signal conductor is situated at a distance substantially equal to half of the diameter of the shield conductor from the second differential signal conductor.

17. The interface apparatus of claim 14, wherein the first conductor and second conductor are each situated at a distance substantially equal to one quarter of the diameter of the shield conductor from an inner surface of the shield conductor.

18. The interface apparatus of claim 14, further comprising contacts that include a male contact and a female contact.

19. The interface apparatus of claim 14, further comprising contacts that are the same sex.

20. The interface apparatus of claim 14, further comprising hermaphroditic pin and socket contacts allowing mating with a differential device regardless of the sex of the contacts of the differential device.

21. The interface apparatus of claim 14, further comprising an alignment hole and an alignment pin providing correct alignment of a mated pair of adapters.

22. The interface apparatus of claim 14, wherein the alignment pin is longer than a connecting plug of the differential interface to provide protection for the connecting plug.

23. The interface apparatus of claim 14, wherein the interface apparatus has a 4 millimeter outer diameter.

24. An apparatus for converting a single-ended signal of a first device having a coaxial interface to a differential signal of a second device having a differential interface while maintaining uniform differential impedance at a connection between coaxial and differential environments, wherein said first device is a testing device and said second device is a device under test.

25. A system for converting from single-ended coaxial signals to differential signals, comprising:

a single-ended coaxial device;

an adapter with at least two coaxial interfaces for coupling to the single-ended coaxial device;

at least two signal conductors for transmitting signals through the adapter;

a transition region within the adapter for providing a transition between coaxial and differential transmission environments and maintaining a uniform differential impedance through the transition; and

a differential interface on one end of the adapter for coupling to a differential device.

26. The system of claim 25, wherein the transition region includes the at least two signal conductors and a shield conductor, the dimensions of which provide the uniform differential impedance.

27. The system of claim 25, wherein the transition region includes a coupling device for connecting a first portion of one of the at least two signal conductors to a second portion of the one of the at least two signal conductors and connecting a first portion of the second of the at least two signal conductors to a second portion of the second of the at least two signal conductors.

28. The system of claim 25, wherein the transition region includes a first portion of one of the at least two signal conductors spliced together with a second portion of the one of the at least two signal conductors and a first portion of a second of the at least two signal conductors spliced together with a second portion of the second of the at least two signal conductors.

29. The system of claim 25, wherein the differential interface includes an air space between the first conductor and the second conductor.

30. The system of claim 25, wherein the at least two coaxial interfaces are standard precision coaxial interfaces.

31. The system of claim 30, wherein the diameter of the at least two coaxial interfaces is selected from the group consisting of 1.0 millimeter, 1.85 millimeters, 2.4 millimeters, 3.5 millimeters or 7 millimeters.

32. The system of claim 25, wherein a center axis of each of the at least two coaxial interfaces is situated at an angle between 0 and 90 degrees from the center axis of the differential interface.

33. The system of claim 25, wherein the differential interface further comprises a mating member for mating to another device for measurement with a 4-port vector network analyzer.

34. The system of claim 25, wherein said transition region further includes a dielectric support structure at or near the transition between the coaxial and differential transmission environments.

35. The system of claim 25, wherein the diameter and dimensions of the first conductor and second conductor vary within the transition region.

36. The system of claim 25, further comprising dielectric beads for supporting the first signal conductor and the second signal conductor.

37. The system of claim 25, wherein the differential interface has a 4millimeter outer diameter with hermaphroditic pin and socket signal contacts.

38. A method for converting from single-ended coaxial signals to differential signals, comprising:

coupling at least two coaxial transmission lines from a first device to at least two coaxial interfaces of an adapter;

providing a connection within said adapter between coaxial and differential transmission environments;

compensating for differential impedance discontinuity at the connection using a transition region of said adapter; and

coupling a differential interface of said adapter to a differential device.

39. The method of claim 38, further comprising varying the dimensions of signal conductors and a shield conductor within said transition region to compensate for differential impedance discontinuity at the connection.

40. The method of claim 38, further comprising converging the at least two coaxial interfaces at a 10 degree angle to form at least one differential line inside the adapter.

41. The method of claim 38, further comprising mating the adapter at the differential interface with another device for measurement with a 4-port vector network analyzer.

42. The method of claim 38, further comprising supporting signal conductors at the transition region at or near said connection using a dielectric support structure.

43. The method of claim 38, further comprising supporting signal conductors in the coaxial interfaces using dielectric beads.

44. A method for converting from single-ended coaxial signals to differential signals by providing a connection between coaxial and differential transmission environments that compensates for differential impedance discontinuity at a connection between coaxial and differential environments, wherein said compensation is achieved prior to connection to a device under test.

45. An insertable test device, comprising:

a first adapter having a first differential interface; and

a second adapter having a second differential interface,

wherein each of the first adapter and second adapter includes at least two coaxial interfaces for coupling to a coaxial device, a first signal conductor for transmitting signals through the adapter, a second signal conductor for transmitting signals through the adapter, a shield conductor, and a transition region for providing a transition between coaxial and differential transmission environments and maintaining a uniform differential impedance through the transition; and the first adapter and the second adapter are mated at the first differential interface and the second differential interface.

46. The insertable test device of claim 45, wherein the mated first adapter and second adapter provides less than –20dB of differential return loss through 18 gigahertz.

47. The insertable test device of claim 45, wherein the mated first adapter and second adapter provides less than –25dB of common mode conversion by reflection through 18 gigahertz at the at least two coaxial interfaces of each of the first adapter and the second adapter.

48. The insertable test device of claim 45, wherein less than –30dB of mode conversion occurs during transmission through the mated first adapter and second adapter.